

Historic, Archive Document

Do not assume content reflects current scientific knowledge, policies, or practices.

Ag 88e

SPECIFICATION
FOR
ELECTRIC WIRING AND CONDUIT SYSTEMS
OF
TWO LABORATORY BUILDINGS

FOR THE
UNITED STATES DEPARTMENT OF AGRICULTURE,
WASHINGTON, D. C.

JAMES WILSON, Secretary of Agriculture.

BUILDING COMMITTEE.

B. T. GALLOWAY, Chairman.

A. C. TRUE.

GIFFORD PINCHOT.

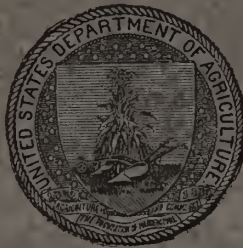
RANKIN, KELLOGG & CRANE, Architects.

JOHN STEPHEN SEWELL, Supervising Engineer.

R. BARNARD TALCOTT,

S. FRANKLIN GARDNER,

Mechanical Engineers.



WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1905.

SPECIFICATION
FOR
ELECTRIC WIRING AND CONDUIT SYSTEMS
OF
TWO LABORATORY BUILDINGS

FOR THE
UNITED STATES DEPARTMENT OF AGRICULTURE,
WASHINGTON, D. C.
JAMES WILSON, Secretary of Agriculture.

BUILDING COMMITTEE.

B. T. GALLOWAY, Chairman.

A. C. TRUE.

GIFFORD PINCHOT.

RANKIN, KELLOGG & CRANE, Architects.

JOHN STEPHEN SEWELL, Supervising Engineer.

R. BARNARD TALCOTT,

S. FRANKLIN GARDNER,

Mechanical Engineers.



WASHINGTON:
GOVERNMENT PRINTING OFFICE,
1905.

ADVERTISEMENT.

OFFICE OF THE BUILDING COMMITTEE,
U. S. DEPARTMENT OF AGRICULTURE,
Washington, D. C., November 24, 1905.

Sealed proposals will be received at this office until 2 o'clock p. m. on the 5th day of January, 1906, and then opened, for the installation of the electric wiring and conduit systems of two laboratory buildings for the United States Department of Agriculture, Washington, D. C., in accordance with the drawings and specifications, copies of which may be obtained at the Office of the Building Committee, United States Department of Agriculture.

All applications must be accompanied by a certified check for \$50, made payable to the Disbursing Clerk of the Department of Agriculture, which checks will be retained until the return of the drawings and specifications.

B. T. GALLOWAY,
Chairman.

346805

INDEX.

GENERAL CONDITIONS.

Pages 5-12.	Paragraph.
Approval of appliances.....	43
Bond.....	15-17
Certified check.....	2
Construction of buildings.....	44-47
Convict labor.....	4
Cutting, restoration, and removal of debris.....	30
Delays.....	19, 20
Designation of parties.....	6-10
Eight-hour law.....	3
Foreman, etc.....	36
Form of contract.....	14
Form of proposal and signature.....	1
Inspection and acceptance of work.....	31
Interpretation of the specification.....	35
Materials and workmanship.....	37-39
Measurements.....	26
Modifications.....	18
Notice to sureties.....	21
Patents.....	28
Payments.....	22-24
Personal interview.....	34
Rights reserved.....	12, 13
Routine of business.....	11
Samples.....	40-42
Subcontractors.....	5
Supervision.....	25
Tests.....	32, 33
Time to complete.....	27
Tools and appliances.....	29

GENERAL DESCRIPTION.

Pages 13-15.	
Distribution system for lighting and power.....	53-55
Drawings.....	49
Explanation of drawings and specifications.....	50-52
Fire-alarm system.....	70-73
Scope of work.....	48
Standard clock system.....	60-65
Telephone and bell wiring systems.....	56-59
Watchman's clock system.....	66-69

CONDUIT INSTALLATION.

Pages 17, 18.	
Bends.....	81, 82
Concealing of conduits.....	84, 85
Conduit.....	74-76
Covering conduits.....	86
Joints.....	83

CONDUIT INSTALLATION—CONTINUED.

	Paragraph.
Pipe sleeves.....	91
Running of conduits.....	77-80
Supporting conduits.....	87-90
Terminal bushings and lock nuts.....	92

BOXES AND FITTINGS OF CONDUIT SYSTEMS.

Pages 19-23.

Cut-outs.....	121, 122
Junction boxes.....	99-104
Junction cabinets.....	107
Materials, etc., of boxes.....	123-126
Outlet boxes.....	93-96
Plug receptacles.....	118-120
Pull boxes.....	105, 106
Receptacle boxes.....	97, 98
Setting of boxes, etc.....	127-129
Snap switches.....	116, 117
Standard clock boxes.....	108-110
Station boxes.....	114, 115
Telephone floor boxes.....	112, 113
Telephone wall boxes.....	111

TABLETS AND CABINETS.

Pages 25-27.

Arrangements of tablets.....	130
Bus bars and fittings.....	134-139
Cabinets for subbasement tablet.....	151-155
Cabinets for tablets above subbasement.....	146-150
Dimensions of cabinets.....	157
Finish of cabinets.....	156
Fuses.....	140, 141
Locks for cabinets.....	158
Marble for tablets, etc.....	131-133
Marking of tablets.....	144, 145
Switches.....	142, 143

SWITCHBOARD.

Pages 29-32.

Bus bars and fittings.....	169-177
Designation of circuits.....	194
Drawings.....	195
Framing.....	161-168
Fuses.....	185-187
Instruments.....	188-193
Panels.....	160
Size of switchboard.....	159
Switches.....	178-184

WIRING INSTALLATION.

Pages 33, 34.

Fish wires.....	207, 208
Insulation.....	206
Joints.....	204, 205
Running of wires.....	200-203
System.....	196
Wire.....	197-199

SPECIFICATION

FOR

Electric Wiring and Conduit Systems of two Laboratory Buildings
for the United States Department of Agriculture, Washington,
D. C.

GENERAL CONDITIONS.

Form of Proposal and Signature.

1. Proposal must be made on the blank form hereto attached, plainly marked "Proposal for Electric Wiring and Conduit Systems," on the envelope or cover, with the title of buildings as given above, and addressed to the Chairman of the Building Committee, United States Department of Agriculture, Washington, D. C., stating in writing and figures (without interlineation, alteration, or erasure) the sum of money for which the bidder proposes to supply the materials and perform the work required by the drawings and specification, the time within which he proposes to complete the work, and the prices called for in proposal sheet for certain portions of the work. The proposal must be signed with the full name and address of the bidder; if a copartnership, the copartnership name by a member of the firm, with names and addresses in full of each member; and if a corporation, by an officer in the corporate name, with the corporate seal attached to each signature. No telegraphic proposals or telegraphic modifications of proposals will be considered. Proposals received after the time advertised for the opening will be returned unopened. If proposal is sent by registered mail, allowance should be made for the additional time required for such transmission.

Certified Check.

2. Each bidder must submit with his proposal a certified check, in amount \$1,000, drawn to the order of the Disbursing Clerk of the Department of Agriculture, and the proceeds of the said check shall become the property of the United States if for any reason whatever the bidder, after the opening of the bids, withdraws from the competition or refuses to execute the contract and bond required, in the event of such contract being awarded to him. Checks submitted by the unsuccessful bidders will be returned after the approval of the contract and bond executed by the successful bidder.

Eight-hour Law.

3. The attention of bidders is called to the Act of Congress, approved August 1, 1892, limiting the hours of daily service of laborers and mechanics employed upon public works of the United States to eight hours in any one calendar day.

Convict Labor.

4. In compliance with Executive order dated May 18, 1905, convict labor can not be employed in connection with this contract.

Subcontractors.

5. No subcontractor or other person furnishing material or labor will be recognized, nor will the United States be responsible in any way for the claims of such persons beyond taking a bond, with good and sufficient sureties, with the additional obligation that the general contractor shall make prompt payment to all persons furnishing him labor or materials used in the prosecution of the work. Persons so furnishing materials or labor to have a right of action on said bond, in the name of the United States for their use.

Designation of Parties.

6. The contracting officer, on the part of the United States, is the Secretary of Agriculture, the officer appointed by him to supervise the construction of the building is designated in these specifications as "Supervising Engineer." The present incumbent of this office is Capt. John Stephen Sewell, Corps of Engineers, U. S. Army.

7. The engineers appointed by the Secretary of Agriculture for the designing and superintending of the mechanical equipment of the buildings are R. Barnard Talcott, consulting mechanical engineer, and S. Franklin Gardner, mechanical engineer and superintendent.

8. All matters pertaining to the installation of the mechanical work are to be handled by the mechanical engineer and superintendent, acting in consultation with the consulting mechanical engineer. All matters, however, involving the structural work of the buildings, modifications in contract, and payments thereon must be approved by the supervising engineer.

9. Wherever the word "bidder" is used herein it shall be held to mean any individual or firm of individuals, or any member of any firm or any corporation signing a bid submitted.

10. Wherever the word "contractor" is used herein it shall be held to mean any individual or firm of individuals, or any corporation, who may contract with the United States to do the work or furnish materials under this specification.

Routine of Business.

11. After the award and signing of the contract, all business relating to the work shall be transacted through the office of the mechanical engineer and superintendent, except as otherwise herein provided.

Rights Reserved.

12. The materials proposed to be used, time for completion of the work, and the competency and responsibility of bidders will receive consideration before award of contract.

13. The Department reserves the right to accept any part or parts of the proposal made at the prices included in same; also to waive any informalities in, and to reject any and all proposals.

Form of Contract.

14. The contract which the bidder agrees to enter into shall be in form based upon the terms of this specification.

Bond.

15. The successful bidder must furnish a bond in a sum equal to 50 per cent of the amount of the contract, with sureties satisfactory to the Department, guaranteeing the fulfillment of all provisions of the contract, the satisfactory completion of the work included therein, within the stipulated time, the prompt payment of all persons furnishing materials or labor required in the execution of the work, and covering all guarantees herein provided for.

16. No payment will be made on this contract until the bond has been submitted to the Department and approved by the Secretary of Agriculture.

17. The contractor must obtain, at his expense, all necessary policies of insurance on work and materials supplied by him, as the same will be at his risk until final completion, inspection, and acceptance; but the contractor will be relieved of any risk for such portions of the buildings as may be occupied by the United States before the entire completion of his contract.

Modifications.

18. The Department reserves the right to make any additions to, omissions from, or changes in the work or materials called for by the drawings and specifications, without notice to the surety or sureties on the bond given to secure satisfactory compliance with the terms of the contract; and the United States further reserves the right to demand additional security when additions are made, if in the judgment of the supervising engineer such security is required. For such additions, omissions, or changes, the contractor must submit a

reasonable proposal. If the proposals submitted are deemed unreasonable by the supervising engineer, he shall, acting for the United States, have the right to fix the value of such additions, omissions, or changes, and no claim for damages on account of such changes or for anticipated profits shall be allowed.

Delays.

19. Each bidder must submit his proposal with the distinct understanding that, in case of its acceptance, time for the completion of the work shall be considered as the essence of the contract, and that for the cost of all extra inspection, salaries, and other expenses entailed upon the United States by delay in completing the contract, the United States shall be entitled to a fixed sum of \$20 as liquidated damages, computed, estimated, and agreed upon, for each and every day's delay not caused by the United States: *Provided*, That the collection of said sum may, in the discretion of the Secretary of Agriculture, be waived in whole or in part, and that the contractor shall be entitled to one day, in addition to said stipulated time, for each day's delay that may be caused by the United States, or may be due to causes which could not have been foreseen or prevented by the contractor.

20. The supervising engineer, acting for the United States, reserves the right to suspend any portion of the work embraced in the contract whenever, in his opinion, it would be inexpedient to carry on said work.

Notice to Sureties.

21. The final inspection and acceptance of the work shown by the drawings and specifications, forming a part of the contract, shall not be binding or conclusive upon the United States if it shall subsequently appear that the contractor has willfully or fraudulently, or through collusion with the representative or official of the United States on the work, supplied inferior materials or workmanship, or has departed from the terms of his contract. In any such case the United States shall have the right, notwithstanding such final acceptance and payment, to cause the work to be properly performed and satisfactory material supplied to such extent as in the opinion of the mechanical engineers may be necessary to finish the work in accordance with the drawings and specifications therefor at the cost and expense of the contractor and the sureties on his bond, and shall have the right to recover against the contractor and his sureties the cost of such work, together with such other damages as the United States may suffer because of the default of the contractor in the premises, the same as though such acceptance and final payment had not been made.

Payments.

22. Payments of 90 per cent of the value of the work executed and satisfactorily in place, based upon the estimated value thereof as ascertained by the supervising engineer, will be made every thirty or sixty days, or as may be provided in the contract, and the payment of the 10 per cent retained will be made after the final approval and acceptance by the Department representative of all work and materials embraced in the contract.

23. The supervising engineer, however, shall have the right to suspend payments at any time if in his judgment the contractor is not using due diligence to procure and submit for approval satisfactory samples as required by the contract, and is not prosecuting his work as promptly as conditions of the building demand.

24. To aid the supervising engineer in ascertaining the value of work done and in place, the contractor shall furnish to the said official, before any payment shall be due, a schedule of prices upon which the contract is based.

Supervision.

25. Every part of the work is to be executed under the direction and to the entire satisfaction of the mechanical engineers, and subject to the final approval and acceptance of the supervising engineer.

Measurements.

26. Bidders should visit the buildings in order to get a satisfactory comprehension of the work required and make such measurements as they may desire, as the drawings accompanying this specification are not intended to be scaled.

Time to Complete.

27. The contract time for the completion of the two laboratory buildings is June 14, 1907, and the work on these buildings under this contract must be begun as soon, and prosecuted as fast, as the condition of the buildings will permit, under the direction of the mechanical engineers, and at such times as will avoid interference with other contracts, and must be completed by the above date.

Patents.

28. The Department will not recognize any demand brought on account of infringement of patents; but will hold the contractor and his bondsmen strictly responsible for any delay or cost resulting from his failure to fully protect the United States against patent rights.

Tools and Appliances.

29. All tools and appliances required for the proper execution of the work must be provided by the contractor and be maintained,

used, stored, and moved at his expense and risk. Contractor must furnish and maintain all artificial lights necessary for the proper execution of the work.

Cutting, Restoration, and Removal of Débris.

30. Contractor shall at his expense do all necessary cutting, drilling, etc., repair in the best possible manner, under the direction of the supervising engineer, any damage incident to his contract, and remove from the premises all debris resulting from the execution of his contract.

Inspection and Acceptance of Work.

31. Any materials delivered or work performed by the contractor, at any and all times during the progress of the work and prior to its final acceptance and the payments therefor, shall be subject to the inspection of the mechanical engineers, who shall reject any part that in their opinion is not strictly in accordance with the contract.

Tests.

32. After the completion or during the progress of the work the Department shall authorize such tests of the installations to be made as may be considered necessary. If these tests show that the work does not comply with the specification requirements, the contractor must immediately make all changes necessary to put the work in proper condition, and shall pay the expenses of all subsequent tests and inspections required to determine whether or not the work is satisfactory.

33. In case the contractor fails to make, within a reasonable time, such changes as are demanded by the mechanical engineers, the supervising engineer reserves the right to have such changes made at the contractor's expense.

Personal Interview.

34. The right is reserved to require the contractor or his authorized representative to visit the Department, without expense to the United States, if at any time it is considered that, in the interest of the United States, a conference is necessary for the prompt adjustment of any complicated or unsatisfactory conditions that have developed in connection with this contract. Any understanding arrived at as a result of such conference shall not be binding until formally approved.

Interpretation of the Specification.

35. In all questions relating to the interpretation of this specification or any part thereof, the decision of the mechanical engineers, concurred in by the supervising engineer, shall be final.

Foreman, etc.

36. The work shall at all times be conducted in charge of a competent superintendent or foreman, who shall represent the contractor and have general authority to act for him, and the contractor shall discharge and not employ upon this work any foreman, or any and all workmen whom the supervising engineer may deem incompetent or careless. The contractor shall also give his personal attention to the work.

Materials and Workmanship.

37. All materials and appliances used under this contract, unless specifically described, shall be of best grade of standard manufacture, and all workmanship shall be strictly first-class.

38. The bidders are required to fill out on the proposal sheet the clauses relating to materials and appliances which they propose to use; also to give the name and address of manufacturers of switchboards, tablets, and cabinets and special floor and wall boxes.

39. Should bidder fail to submit such a list of materials and appliances, or in the event the materials and appliances named on the proposal sheet in any case are considered unsatisfactory, the Department reserves the right to name articles and materials which will conform to the specification, and the selection by the Department shall be final and binding upon the contractor.

Samples.

40. The Department reserves the right to require the contractor to submit samples of any or all articles or materials to be used under this contract, including tablets and cabinets and special floor and wall boxes, which samples, if approved, may be used on the work after serving their purpose as samples.

41. Samples if requested must be received in ample time for their proper consideration and approval, and for the execution of the work thereafter within the contract time for completion.

42. In the event the contractor delays the submission of samples when called for, so that there does not appear to remain sufficient time for the execution of the work, the Department reserves the right to abrogate the contract or to purchase materials and have the work performed at the expense of the contractor.

Approval of Appliances.

43. The approval of any appliances or materials named or submitted by contractor is to be understood as subject to the specification requirements, and not as an absolute acceptance.

Construction of Buildings.

44. The buildings are to be of solid masonry construction, all walls and partitions being of brick, the outside walls being faced with

stone or face brick, and furred on the inside with 2-inch-thick hollow terra-cotta furring blocks.

45. All interior partitions are of brick, and the double partitions are to be formed with two $4\frac{1}{2}$ -inch brick walls having a 14-inch space between.

46. Floor construction is to be of reenforced concrete, composed of reenforced concrete beams separated by terra-cotta tiles.

47. It is contemplated having each floor put in as the walls go up, and this contractor will be permitted to rough-in his conduits and place cabinets and boxes up to the under side of the highest floor in place, but will not be allowed to place any work entirely exposed to the weather.

GENERAL DESCRIPTION.

Scope of Work.

48. This specification, with accompanying drawings, is to describe a complete conduit and wiring system for lighting and power, the light to be furnished to all fixture outlets and the power being furnished at the wall receptacles and at location of motor tablets, a conduit system for telephone and bell wires, a conduit system for standard clocks, and a conduit installation for watchman's clock and fire-alarm systems.

Drawings.

49. The drawings, Nos. E-W-101 to E-W-115, inclusive, show the complete layout of the systems required to be installed under this contract, and upon these drawings the proposals are to be based.

Explanation of Drawings and Specifications.

50. The drawings are to be taken together with the specifications and not separately, and should there exist any discrepancy between them the contractor shall apply to the mechanical engineers for further and particular instructions for each case, and failing to do so shall make the work right at his own expense, to the satisfaction of the mechanical engineers.

51. The drawings above referred to include plans of both buildings designated as Laboratory A and Laboratory B. The two buildings are entirely similar in construction, but in reversed positions, and the systems as laid out to be installed in the two buildings are practically identical. The plans of both buildings are prepared for convenience in installing the work.

52. This specification, however, will refer to the work installed in one building only, and the bidders must understand that the specification applies to both buildings alike.

Distribution System for Lighting and Power.

53. The distribution center of the conduit and wiring system for lighting and power circuits is to be the distributing switchboard in subbasement. Lighting circuits are to be run from the switchboard to the riser tablets at the base of the six riser chases, designated as A, B, C, D, E, and F, and to the subbasement branch-circuit tablet, and power circuits to the four motor tablets in subbasement, to the three elevator motor tablets in attic, and to the cut-out junction box in attic, from which circuits are to run to the three fan motor tablets in attic.

54. From each of the lighting riser tablets, at the base of the riser chases, a separate circuit is to be run to a branch-circuit tablet in each story, from which tablet circuits are to be run to the various lighting outlets and wall receptacles, located as shown on the plans.

55. No lighting fixtures or motor tablets are included in this contract.

Telephone and Bell Wiring System.

56. A conduit system with special outlet and junction boxes is to be installed as shown on the plans for telephone and bell wiring, a wall and also a floor outlet being provided in each room.

57. On the subbasement ceiling, at the base of each of the six riser chases, A, B, C, D, E, and F, a junction box is to be installed. From each of these junction boxes a conduit is to be run up in the adjacent chase, passing through a junction box located in wall near floor in each story, the conduit terminating at fourth-story junction box. From each of these latter junction boxes a separate conduit is to be run to each individual room, connecting in each room to a wall box, from which a conduit is to be run to a box located approximately in the center of the rooms; the exact location of these floor boxes to be as directed by the mechanical engineers.

58. Cross-over conduits are to be run as shown in each story, below the corridor floors, connecting the six junction boxes in each story.

59. Conduits of this system are to be fished, but wiring, bells, telephones, etc., are not included in this contract.

Standard Clock System.

60. A conduit system is to be installed for standard clocks, connecting with a clock outlet box in each room, and a master-clock box in basement story where noted.

61. This system is arranged in seven circuits, one connecting all outlet boxes on each of the two sides of the wing, and one connecting boxes of each story of the main portion of the building.

62. One main-riser conduit for this system is to be located where indicated on the plans, extending from a junction box in subbasement to a junction box just below the ceiling of third story, this riser connecting with a junction box in each story near ceiling.

63. From each junction box on the main riser, horizontal circuits are to be run in the floor construction above the junction boxes to the outlets in each room. The circuit connections for the wing are to be run in the first-floor construction, starting from the junction box near basement ceiling.

64. An additional conduit, besides the main-riser conduit, is to be installed between the subbasement junction box and the box near basement ceiling, and from the latter box a conduit connection is to

be made to a clock outlet box to be located where directed, adjacent to the junction box, for connections to the master clock.

65. Conduits for this system are to be fished, but wiring, switch-board, batteries, and clocks are not included in this contract.

Watchman's Clock System.

66. A conduit system with station boxes is to be installed for a ten-station watchman's clock system.

67. Where indicated on the plans, at two points in the corridor, a riser is to be run from a junction box located on wall near subbasement ceiling to the fourth story, connecting in each story with a station box placed 5 feet above the floor line. A cross-connection conduit is to be run in subbasement between the two junction boxes, pull boxes being placed on this connection where necessary for convenience in drawing in the wires.

68. On one of the riser conduits in basement story where indicated, about 7 feet 6 inches above the floor line, a junction box, entirely similar to the station boxes, is to be installed as an outlet box for circuit connections to the recording clock, and conduit connections are also to be made to this box from the basement circuit of the standard clock system.

69. Conduits for this system are to be fished, but wiring, recording clock, and signal devices are not included in this contract.

Fire-alarm System.

70. The fire-alarm system is to consist of ten stations located at points of watchman's signal stations.

71. Two riser conduits are to be run from junction boxes in subbasement to station boxes in fourth story. The conduits are to be run parallel to the conduits of the watchman's clock system and are to be connected with the station boxes of that system.

72. From the junction box specified at the location of the recording clock of the watchman's clock system a conduit connection is to be made to a standard clock box which is to be used as an outlet box: this outlet box to be placed adjacent to the junction box as indicated.

73. Conduits for this system are to be fished, but wires, alarm movements, batteries, etc., are not included in this contract.

CONDUIT INSTALLATION.

Conduit.

74. Conduit for all systems must be of best quality cold-drawn steel tubing, smooth inside and outside, electro-galvanized or enameled with a material which will not crack off, will prevent corroding, and will not soften or become sticky.

75. Conduit must be of standard gas-pipe dimensions, and, where sizes are not given on the drawings, same is to be of such size as to permit the ready insertion and withdrawal of the necessary wires without abrasion. No conduit smaller than $\frac{1}{2}$ inch standard shall be used.

76. Each length of conduit must bear the maker's name, initial, or trade-mark.

Running of Conduits.

77. Conduits are to be run for the various systems, as shown on the plans and riser diagrams, and as outlined in the general description of the different systems.

78. The two wires of each lighting and power circuit are to be run in the same conduit.

79. All runs are to be continuous between the different junction points, as tablets, junction boxes, outlet boxes, wall receptacles, etc., in as direct and straight lines as possible.

80. Unless otherwise noted on plans, all horizontal runs of conduit to lighting fixtures are to be run in floor construction of story above that upon which they are shown. All horizontal runs of conduit to wall-plug receptacles are to be run in the floor construction of the story upon which they are shown.

Bends.

81. All conduit is to be run with easy turns and long bends, and not more than four quarter-turn elbows or bends are to be used in any run between junction points.

82. All bends must be free from kinks, dents, and bruises, and the radius of the curve of the inner edge must be not less than $3\frac{1}{2}$ inches.

Joints.

83. All joints in conduits and between conduits and all boxes are to be carefully made with white lead, so as to be absolutely watertight. Ends of conduits at each joint are to be cut square and smooth, to be reamed and ends brought together in center of couplings.

Concealing of Conduits.

84. All conduits are to be run concealed in floors, walls, chases, etc., except the main-feeder conduits and certain branch-circuit conduits where noted in subbasement, the branch-circuit and motor-feeder conduits in attic, and conduits shown in elevator shafts.

85. Conduits in plastered walls are to be so run that they will be covered by not less than $\frac{1}{2}$ inch of plaster.

Covering Conduits.

86. All conduits exposed on attic floor are to be plastered over with cement mortar composed of 1 part Portland cement to 2 parts clean, sharp sand. Plaster to be not less than $\frac{1}{2}$ inch thick over top of conduit, and mound over conduit to be finished smooth in a neat and workmanlike manner.

Supporting Conduits.

87. The main-feeder conduits in subbasement, from the switchboard, are to be supported on 4-inch **I** beams running across the central corridor, the tops of the beams being 10 inches from the ceiling line. These beams are to be placed under another contract.

88. Conduit connections to switchboard are to be made as indicated on drawing No. E-W-108. Two 2½-inch tee-bar supports are to be provided back of switchboard as indicated, one end of the bars being set into the corridor wall and the other ends supported by bolts passing through basement floor with heads resting on suitable iron plates above the concrete-floor construction.

89. Where conduits run below the **I** beams or tee bars they are to be securely supported from same with approved pipe hangers.

90. Conduits not embedded in floors, etc., are to be properly and securely fastened in place with hangers, pipe straps, or other approved fastenings, throughout their entire length.

Pipe Sleeves.

91. Where indicated on the subbasement plan, pipe sleeves have been placed in the brick walls through which the conduits are to be run. Where conduits are shown to pass through walls and sleeves are not indicated as in place, the necessary openings must be cut and sleeves installed under this contract and the walls carefully repaired after conduits have been run.

Terminal Bushings and Lock Nuts.

92. Terminals of all conduits at switchboard, cabinets, and at all junction, outlet, wall, and floor boxes, etc., to be provided with lock nuts and terminal bushings of approved pattern with rounded edges.

BOXES AND FITTINGS OF CONDUIT SYSTEMS.

Outlet Boxes.

93. At each fixture outlet there is to be provided an approved outlet box of pressed steel not less than $\frac{1}{16}$ inch thick and not over 4 inches in diameter, and provided with only the necessary number of openings required to accommodate the conduits.

94. Boxes are to be set so that outer edge shall not project more than $\frac{1}{4}$ inch beyond finished plaster lines.

95. The outlets in corridors above subbasement, except in attic, are to be arranged for combination fixtures, but all other outlets are for electrical fixtures only.

96. The ceiling outlet boxes, except boxes for combination fixtures, are to be supported by an iron plate $\frac{1}{4}$ by 3 by 12 inches placed above the reenforced concrete floor construction, the outlet boxes being secured to a bolt, threaded with a $\frac{3}{8}$ -inch gas-pipe thread, by a lock nut on either side of the box, the bolt to extend through the center of the plate, and to be of necessary length to project $\frac{3}{4}$ inch beyond finished plaster line. Bracket outlet boxes are to be firmly anchored in place and to be provided with approved fixture studs.

Receptacle Boxes.

97. Where indicated in subbasement, receptacle boxes, with receptacle for a single 16-candlepower lamp screwed to bottom of same, are to be installed, securely fastened on face of walls with expansion bolts, or in some other approved manner.

98. Receptacle boxes to be of pressed steel, similar to fixture outlet boxes, having the required number and size of openings to accommodate the conduits. Receptacles are to have finished-brass covers polished and lacquered, which are to turn down over sides of boxes.

Junction Boxes.

99. On the lighting branch circuits in subbasement, at points where indicated in elevator shafts, and at location of the four motor tablets in subbasement, and the six motor tablets in attic, and also at the junction point for the three fan-motor branch circuits in attic, junction boxes, with hinged covers, of cast iron not less than $\frac{1}{8}$ inch thick or pressed steel not less than $\frac{1}{16}$ inch thick, of suitable size to accommodate the conduit or conduits connecting to same, are to be secured in place in an approved manner.

100. The six junction boxes at the termination of the telephone and bell wiring risers, the two junction boxes at the base of the watchman's clock and fire-alarm system risers, and the subbasement junction box of the standard clock system, all shown on the subbasement

plan No. E-W-101, are to be entirely similar to the boxes above specified, to be not less than 9 inches square and are to be securely fastened to subbasement ceiling or wall near ceiling as indicated.

101. Boxes of the telephone and bell wiring system are to have a 2-inch-diameter opening on each of the two sides, adjacent to the side at which the conduit enters from the riser chase.

102. Boxes at motor tablets, at the base of the watchman's clock and fire-alarm system risers, and subbasement box of the standard clock system, are to be provided with one or two additional openings of size of that for connecting conduit for future conduit connections.

103. Boxes in elevator shafts are to be provided with a bushed opening through center of covers.

104. The junction boxes, on the main-riser conduit of the standard clock system above the subbasement, are to be as specified for subbasement junction boxes, except that these boxes are to be provided with finished-brass, nickel-plated covers, not less than $\frac{3}{16}$ inch thick, having beveled edges, secured to boxes with brass countersunk screws: the covers to project not less than $\frac{3}{4}$ inch on all sides beyond the edges of the boxes, and boxes are to be set so that the backs of covers will be flush with the finished plaster line. The box in basement is to be not less than 9 inches and boxes above basement not less than 6 inches square, inside dimensions.

Pull Boxes.

105. Approved steel or cast-iron pull boxes, similar to junction boxes herein specified, are to be installed at points in lighting and power circuits where necessary, to reduce number of bends, length of runs between boxes, and for convenience in drawing in wires. Where installed in floors, they are to be of the design of telephone floor boxes hereinafter described.

106. Pull boxes are also to be placed where required on the cross connection in subbasement of the watchman's clock and fire-alarm systems.

Junction Cabinets.

107. The junction cabinets for telephone and bell wiring system, which are to be placed in each story at each of the six riser chases, are to be constructed of cast iron $\frac{1}{4}$ inch thick and provided with a hinged cast-bronze door with lock, in full conformity with details given on drawing No. E-W-105.

Standard Clock Boxes.

108. In every room above subbasement, except toilet rooms, and also in the basement corridor at two points where specified, a standard clock outlet box is to be securely fastened in place where indicated.

109. These boxes are to be constructed of cast iron $\frac{1}{8}$ inch thick having a cast-brass screw cover furnished with a fiber bushing in center of covers; covers to be finished and nickel-plated. Details of the construction required for these boxes are shown on drawing No. E-W-104 and boxes furnished must conform entirely with these details.

110. The 4-inch square boxes are to be used in all cases except where three conduit connections are required on one side, in which cases the $3\frac{1}{2}$ by $5\frac{1}{2}$ inch boxes are to be used.

Telephone Wall Boxes.

111. Telephone wall boxes, one of which is to be installed in each room above the subbasement, are to be constructed of $\frac{1}{8}$ -inch-thick cast iron provided with finished-brass, nickel-plated covers, in accordance with details given on drawing No. E-W-104.

Telephone Floor Boxes.

112. Near the center of the floor in each room, as shown on the plans, telephone floor boxes of $\frac{1}{8}$ -inch-thick cast iron with cast-iron screw cover, and a finished and polished brass floor plate, with screw plug, all parts constructed as shown on drawing No. E-W-104, are to be installed.

113. With each of these boxes a brass screw outlet plug with fiber bushing is to be furnished, in addition to the solid screw plug, which is to be constructed in conformity with details on drawing No. E-W-104. For the placing of these outlet plugs six steel wrenches with suitable hard-wood handles are to be provided.

Station Boxes.

114. The station boxes and box at location of recording clock, all located on the riser conduits of the watchman's clock and fire-alarm systems, are to be of cast iron having finished-brass, nickel-plated covers, constructed as shown, and of dimensions given, by details on drawing No. E-W-106.

115. These boxes are to be securely fastened in place about 5 feet above the floor line, one in each story on each of the two sets of risers, so placed that the back of the cover plates will be flush with the finished plaster line. Openings in boxes are to be provided for conduit connections shown by the diagrams, and through covers as shown by the details.

Snap Switches.

116. The snap switches indicated on subbasement plan to be placed at entrances to the various passages are to be 10-ampere, double-pole, flush-type switches, of heavy pattern and of approved manufacture.

117. Switches are to be placed in special pressed-steel boxes properly fastened to face of walls and provided with brass cover plates polished and lacquered.

Plug Receptacles.

118. Where indicated on the plans that wall-outlet boxes for power circuits are to be placed, plug receptacles of 10 amperes capacity, of approved make, of heavy construction, with large contact surfaces, are to be installed.

119. Receptacles are to be secured in pressed-steel boxes, set into the walls so that the backs of the brass nickel-plated cover plates, which are to be furnished with the receptacles, will be flush with the finished plaster lines.

120. An approved plug is to be furnished with each receptacle, and cover of receptacle must be arranged so that same can be closed when plug is in place.

Cut-outs.

121. A porcelain cut-out block of approved make and design, having 2-wire feeders and two 2-wire branches, of required capacity, arranged for plug fuses, is to be securely placed in the junction box, herein specified, to be located in the double elevator shaft.

122. In the junction box in attic, at the junction point of the three fan-motor circuits, a porcelain cut-out, as described above, of necessary capacity, having 2-wire feeders and three 2-wire branches, is to be placed.

Materials, etc., of Boxes.

123. All the boxes, receptacles, etc., required in connection with this contract are to be manufactured of the best materials and constructed in the best possible manner, all edges being true to shape, and surfaces smooth and even. Castings must be of best gray iron entirely smooth and even in thickness. Threads must be carefully cut so that the various parts will fit together perfectly.

124. Finished-brass surfaces, not to be nickel-plated, are to be highly polished and lacquered.

125. Iron surfaces must be coated with a noncorroding compound, giving finish and protection equal to that required for conduits.

126. Openings in boxes, all to be carefully drilled, must be of sizes and numbers required for the conduit connections, as given on the plans.

Setting of Boxes, etc.

127. Special attention must be given to the setting of all boxes, etc., connected with this work. The snap switches and receptacle boxes of subbasement are to be placed on the face of the walls, but

all plug receptacles, telephone junction cabinets, clock outlet and junction boxes, telephone wall-outlet boxes, and station boxes of watchman's clock system are to be set into the walls, the back of the cover plates coming exactly flush, in all cases, with the finished plaster line.

128. Telephone floor boxes and pull boxes, where necessary, are to be set into the floor construction, openings of exact sizes and depths being cut in the flooring for the cover plates, so that the floor will fit tightly around plate and top of plate will be flush with finished floor line.

129. Unless otherwise indicated, boxes, etc., are to be set with their center lines at the following elevations above the finished floor lines:

Outlet boxes for bracket lighting fixtures, 5 feet 6 inches.

Plug receptacle, 4 feet.

Snap switches, 5 feet.

Receptacle boxes, 5 feet.

Junction cabinets for telephone and bell wiring systems, 1 foot 9 inches.

Telephone wall-outlet boxes, 1 foot.

Clock outlet boxes, 10 feet.

Station boxes of watchman's clock system, 5 feet.

TABLETS AND CABINETS.

Arrangement of Tablets.

130. The distribution tablets, indicated on the plans, are to be arranged, as shown by diagrams on drawings Nos. E-W-101 and 102, for 2-wire feeders and 2-wire branches of the number indicated on the diagrams, each branch circuit being provided with switch and fuses.

Marble for Tablets, etc.

131. The tablets are to be of blue Vermont marble $\frac{7}{8}$ inch thick, except tablets for subbasement, which are to be 1 inch thick, of suitable dimensions to accommodate the required number of circuits. The marble slabs forming the inner compartment of the cabinets are to be of material of tablets, $\frac{5}{8}$ inch thick.

132. Marble of slabs to be highly polished, without metallic veins, dark streaks, or other defects, and sides are to be cut square and smooth, all edges being square, except the front edges for the subbasement riser tablets, which are to have a $\frac{1}{4}$ -inch bevel.

133. All holes through slabs must be properly drilled, of the required sizes.

Bus Bars and Fittings.

134. The main bus bars are to be placed on the back of the tablets, and all cross-over bar connections for the different circuits are to be placed on the front of the tablets.

135. Bus bars, connections, and washers are to be stamped, rolled, or forged copper of high conductivity and are to have square edges and be uniform in size, all exposed portions being highly polished and lacquered.

136. The bus bars and other copper connections on the tablets must be of ample current capacity, based on a current density of not over 800 amperes per square inch, the capacity to be figured with all lamps and plug receptacles in service, an allowance of 0.3 ampere being made for each 16-candlepower lamp and an allowance of 5 amperes for each plug receptacle.

137. Cupped terminal lugs are to be provided for all feeder connections to tablets.

138. Studs, bolts, terminal lugs, etc., may be of brass having a cross-sectional area in proportion to its conductivity. Such parts, if of brass, must, however, be heavily copper-plated to match finish of bus bars.

139. Spacing of bus bars, studs for switches, fuses, etc., must be in all cases in full conformity with the requirements of the latest edition of the National Electrical Code.

Fuses.

140. Fuses for the tablets are to be of 220-volt, nonarcing, cartridge type of capacity to protect the smallest wire on the circuit, provided at ends with clips to be secured to fuse studs with set screws.

141. Two complete sets of fuses are to be furnished for all tablets.

Switches.

142. Tablet switches are to be of approved make, 220-volt, 25-ampere or 50-ampere capacity, as indicated on the diagrams, double-pole, single-break, single-throw knife switches, strongly constructed, highly polished and lacquered, and provided with fiber crossbars and handles.

143. Cup washers must be provided for switches, so that the same will be held firmly in any position.

Marking of Tablets.

144. Circuits, from each subbasement riser tablet, and also from all branch-circuit tablets, are to be designated by a neat, metal number plate secured to board between the fuses; numbers to correspond with numbers given on tablet diagrams.

145. Each tablet is to be designated by the letters and number given on the plans, which letters and numbers are to be properly placed at the bottom of the tablets and are to match in style the number plates on circuits; the former, however, are to be at least double the size of the latter.

Cabinets for Tablets above Subbasement.

146. Tablets, above subbasement, are to be placed in metal cabinets constructed as shown by details on drawing No. E-W-102.

147. Sides of cabinets to be of $\frac{1}{4}$ -inch-thick wrought iron, framed with $1\frac{1}{2}$ -inch angle irons at corners, backs of cabinets to be of $\frac{1}{8}$ -inch-thick wrought iron, secured by tap screw to the sides.

148. The tablets are to be secured in cabinets to a 1-inch angle-iron frame, as indicated, and the $\frac{5}{8}$ -inch-thick marble slabs are to be placed around tablets, forming a lining for the metal box on two sides, and a wiring compartment at top and bottom of tablets. The tablets and marble side pieces are to be securely fastened to the angle-iron framing or the box sides, as the case may be, with $\frac{1}{4}$ -inch brass bolts, having polished round or flat heads, as shown, the marble side pieces being countersunk to receive the flat-headed bolts.

149. Cabinets are to be provided with wood mats and doors, $1\frac{1}{2}$ inches finished thickness, of well-seasoned yellow pine, finished to

match adjacent woodwork. Wood mats are to be bolted to a 1-inch angle-iron frame with brass bolts, the angle-iron frame being riveted to the sides of the metal box as shown.

150. Doors are to be secured on heavy pattern brass hinges and provided with a beveled plate-glass panel.

Cabinets for Subbasement Tablets.

151. The cabinets for riser tablets in subbasement are to be constructed as shown by details on drawing No. E-W-101.

152. Sides of cabinets to be $\frac{1}{4}$ -inch-thick wrought iron, secured at corners with $1\frac{1}{2}$ -inch angles; backs to be of $\frac{1}{8}$ -inch-thick wrought iron secured by tap screws to the sides.

153. Tablets are to be supported on angle irons, as shown, and cabinets are to be fastened in place with expansion bolts, as indicated.

154. Cabinets to be provided with double metal doors of $\frac{1}{8}$ -inch-thick wrought iron, having reenforcing strips, as shown, finished-brass hinges, bolts, and locks.

155. The cabinet for the branch-circuit tablets in subbasement may be of stock pattern and design, as approved by the mechanical engineers. This cabinet must be similar in construction to cabinets for branch-circuit tablets, herein specified, having a heavy metal outer box with angle-iron frame, and blue Vermont marble inner compartment, with wiring space on the top and two sides of tablet, the bus bars being placed vertically. Cabinet to have heavy metal, tight-fitting door, with metal frame; door being provided with heavy pattern hinges and lock.

Finish of Cabinets.

156. Iron parts of all cabinets are to be painted with two coats of graphite paint and finished with an additional coat of enamel.

Dimensions of Cabinets.

157. The dimensions, given on the details for cabinets, are not absolute and slight deviations from same will be allowed, it being desired that the tablets, while conforming with the requirements given, be as compact as practicable. Any changes in the dimensions for cabinets must, however, be approved in writing by the mechanical engineers before cabinets are constructed.

Locks for Cabinets.

158. All cabinets for tablets must be provided with a suitable brass lock for flat keys, all locks to be alike, and six keys are to be furnished.

SWITCHBOARD.

Size of Switchboard.

159. The main distributing switchboard is to consist of three panels, one for main-feeder connections with instruments, one for lighting feeders, and one for power feeders. Board to be constructed in conformity with details given on drawing No. E-W-108.

Panels.

160. Panels to be of selected blue Vermont marble, highly polished on faces, 2 feet 6 inches wide, 4 feet 9 inches high, and $1\frac{1}{2}$ inches thick, having $\frac{3}{8}$ -inch beveled front edges. Slabs must be free from metallic veins and dark streaks and must be cut true and square, edges fitting closely together.

Framing.

161. The panels are to be supported on a $2\frac{1}{2}$ -inch angle-iron frame composed of six vertical members extending from the $\frac{1}{2}$ by 3 inch iron floor plate to tops of slabs, the angles being secured at floor by metal corners, bolted to the angles and fastened rigidly to the floor by heavy expansion bolts passing through the iron floor plate. The slabs are to be set 1 foot 3 inches above floor line and are to rest on 1-inch angle iron, extending entirely across the front of the board, securely bolted to each vertical angle.

162. Four approved adjustable wall braces are to be bolted to the angle-iron frame and securely fastened to the wall with heavy expansion or through bolts.

163. The ends of the conduits for the lighting and power feeders are to terminate near top of board, as indicated. Conduits to be secured by straps of $\frac{1}{4}$ -inch round iron with threaded ends, provided with washers and nuts, which are to draw conduit up tightly against two $1\frac{1}{2}$ -inch channels extending across the rear of the panels. These channel irons are to be bolted at their ends to $\frac{3}{8}$ by $1\frac{1}{2}$ inch bar-iron straps, which straps are to be bolted to the switchboard frame.

164. The main feeders, which are to be lead-covered cables of capacity indicated, are not included in this contract, but provision must be made, as shown, for supporting the ends of these cables, a $\frac{1}{2}$ by 2 inch bar-iron strap being bolted to the $2\frac{1}{2}$ -inch angles of the center panel and this strap being drilled for suitable clamps of cast or bar iron with bolts as indicated, which are to be provided under this contract.

165. The entire frame is to be bolted together in an approved and substantial manner, with $\frac{5}{8}$ -inch-diameter hexagonal bolts with washers and nuts.

166. The bolts securing panels to frame to have hexagonal acorn cap nuts, finished brass, copper-plated.

167. Rubber washers are to be placed between panels and iron frames to prevent unequal pressure on panels when same are bolted in place.

168. All angles, channels, straps, bolts, etc., used in the construction of the switchboard must be properly painted with a noncorroding compound and given a smooth, even surface.

Bus Bars and Fittings.

169. The main bus bars and branch connections are to be placed on the back of the board and arranged as shown on drawing No. E-W-108.

170. Bus bars, also switch blades, washers, etc., are to be stamped, rolled, or forged copper of highest conductivity, accurately shaped, cut square, and true to size. All metal parts on front of board are to be highly finished and lacquered.

171. Fuse studs, bolts, etc., may be of brass, but if so they must have a cross-section area in proportion to its conductivity and be heavily copper-plated, to match finish of copper parts.

172. The bus bars and branch connections are to consist of one or more copper bars. The number and thickness of these bars in each case are given on the details, and the width of the bars must be such as will give ample cross section for maximum current, figured from the capacity of switches, the current density in no case being over 800 amperes per square inch.

173. The spacing of bus bars, studs, etc., must conform in every particular with the requirements for such work, as set forth in the latest edition of the National Electrical Code.

174. All bolted or screwed connections with bus bars, etc., must have a carefully fitted contact surface, of not less than 1 square inch for 70 amperes of current. Such connections must be made with copper washers and lock nuts or washer nuts.

175. All switch, fuse, and instrument studs are to be firmly bolted to marble panels with bolts having hexagonal nuts and washers.

176. Cup lugs, of cast copper, of required sizes for feeders, are to be provided for all feeder connections.

177. The bus bars are to be supported on two approved heavy cast-iron brackets securely bolted to the angle-iron frame of switchboard, as indicated. Bus bars are to rest on porcelain blocks or other approved insulators, which are to be placed on the cast-iron brackets.

Switches.

178. The lighting panel is to have mounted thereon two 25-ampere, two 50-ampere, four 150-ampere, and two 200-ampere switches.

179. The power panel is to have mounted thereon four 25-ampere, two 50-ampere, one 100-ampere, and three 150-ampere switches.

180. The main-feeder panel is to have mounted thereon two 800-ampere switches.

181. All switches to be constructed for 220 volts. Switches on lighting and power panels to be knife pattern, double pole, single break, single throw, arranged as shown, having studs for nonarcing cartridge fuses on face of board.

182. Switches on the main-feed panel are to be knife pattern, double pole, single break, double throw.

183. All switches on switchboard are to be of pure drawn copper, having sufficient thickness of metal for stiffness, designed so that at full load the current density will not exceed 800 amperes per square inch in blades and 75 amperes per square inch at all bearings.

184. Hinges are to be provided with spring washers, so that switches will be held firmly in any position. Switch handles and bridges are to be of hard rubber or nonabsorbent black fiber.

Fuses.

185. All feeder circuits, except main-feeder circuits on center panel, are to be protected by nonarcing cartridge fuses placed on face of board, as indicated.

186. Main-feeder circuits are to be protected by open-type link fuses mounted on a $1\frac{1}{4}$ -inch-thick slate slab, at rear of board. Slab to be bolted to a 2-inch angle iron at each end, which angles are to be bolted to the $2\frac{1}{2}$ -inch angle-iron frame.

187. Two complete sets of fuses are to be provided for all circuits.

Instruments.

188. The main-feeder panel of switchboard is to have mounted thereon, in addition to the main switches, two voltmeters and two ammeters, a voltmeter and an ammeter being placed on the lighting and also the power main-feeder circuit.

189. Instruments are to be arranged on switchboard as indicated and securely fastened in place.

190. The voltmeters are to be Weston round-pattern, Type F instruments, having range of from 0 to 250 volts, the smallest scale division being 2 volts.

191. The ammeters to be Weston round-pattern, Type F instruments, having range of from 0 to 750 amperes, the smallest scale division being 5 amperes. Ammeters to have suitable shunts connected to bus bars as indicated by details.

192. Voltmeters and ammeters are to have back connections, must be practically dead beat, accurately calibrated and properly adjusted, and have approved finish.

193. Instrument connections are to be made as indicated with No. 14 B. & S. weatherproof wire properly secured to back of board with brass clips.

Designation of Circuits.

194. Each circuit of switchboard, including the main-feeder circuits, is to be provided with a neat copper plate. Legend, approximate size of plates, and location of plates to be as indicated on the drawings. Blank plates to be placed as shown at spare switches.

Drawings.

195. The contractor must submit for approval, in triplicate, complete working drawings of the switchboard, showing all details of construction, spacing, and size of bars, switches, etc., which drawings must be approved by the mechanical engineers before the switchboard is constructed.

WIRING INSTALLATION.

System.

196. The wiring system for lighting and power to be 2-wire, 220 volts, direct current, for all circuits. All circuits to be run in conduits as hereinbefore specified.

Wire.

197. Conductors must be rubber-covered, well-tinned, soft-drawn copper, of highest conductivity and made in accordance with the National Electrical Code standards and have distinctive markings.

198. All wires Nos. 8 B. & S. gauge and larger are to be stranded, and no wire smaller than No. 14 B. & S. gauge is to be used.

199. Feeders and branch-circuit conductors must not be less than the sizes B. & S. gauge marked or noted on the plans.

Running of Wires.

200. Feeders are to be run from switchboard to all riser tablets, to the elevator-motor tablets, to fan-motor tablets, to pump-motor tablets, and to the branch-circuit tablet in subbasement. From the riser tablets, feeders are to be run to the various branch-circuit tablets, from which tablets branch circuits are to be run to all fixture outlets and wall receptacles shown on the plans.

201. At all fixture outlets and at junction boxes at location of motor tablets, loops or ends not less than 6 inches long at fixture outlets and 3 feet long at other points are to be left for future connections.

202. Wires are not to be placed in conduits until all plastering is completed and dry and the conduits dry and entirely free from moisture.

203. The feeder connections at switchboard, from ends of conduits to lugs, are to be properly arranged, having as little sag as possible and fastened in place in an approved manner.

Joints.

204. No joints will be allowed in feeder circuits, or in branch circuits except at outlet boxes, junction boxes, pull boxes, etc., at which points the wires are to be properly twisted together, the joints soldered and well taped.

205. Feeder connections at tablets, etc., must, in all cases, be made by soldering conductors into cup lugs.

Insulation.

206. The entire wiring must test free from short circuits and from grounds, and must have an insulation between conductors of opposite

polarity and between conductors and ground, based on maximum load of not less than the requirements of the latest edition of the National Electrical Code.

Fish Wires.

207. All conduits, including conduits for the lighting, power, telephone and bell wiring, standard clock and watchman's clock and fire-alarm systems, are to be fished before the plastering is finished to guard against obstructions and omissions.

208. Fish wires are to be left in the conduits for the telephone and bell wiring, standard clock, watchman's clock, and fire-alarm systems.

PROPOSAL FOR ELECTRIC WIRING AND CONDUIT
SYSTEMS OF TWO LABORATORY BUILDINGS
FOR THE UNITED STATES DEPARTMENT OF
AGRICULTURE, WASHINGTON, D. C.

N. B.

209. After these proposal sheets have been filled out by the bidder, they must be detached from specification and forwarded under separate cover, with postage prepaid by the sender.

210. Bidders are notified that lump-sum proposals for the entire work must be submitted and that proposals for only portions of the work will not receive consideration. All amounts of proposals must include work in both buildings.

211. The various amounts, names of appliances, materials, etc., on the proposal sheet are requested to be typewritten.

....., 190 .

To the SECRETARY OF AGRICULTURE,
Washington, D. C.

SIR:

212. hereby propose to furnish all the labor and materials to complete the entire Electric Wiring and Conduit Systems of Two Laboratory Buildings for the United States Department of Agriculture, in strict accordance with drawings Nos. E-W-101 to E-W-115, inclusive, and the specification, for the sum of

..... (\$.....)

213. Amount included in total bid for all labor and materials required for work in connection with the System for Lighting and Power,

..... (\$.....)

214. Amount included in total bid for all labor and materials required for work in connection with the Telephone and Bell Wiring System,

..... (\$.....)

II

215. Amount included in total bid for all labor and materials required for work in connection with the Standard Clock System,

.....
..... (\$.....)

216. Amount included in total bid for all labor and materials required for work in connection with the Watchman's Clock and Fire-alarm Systems,

..... (\$.....)

217. Amount included in total bid for each switchboard complete,

.....
..... (\$.....)

218. Amount to be deducted for each telephone floor box with conduit connection to telephone wall box, which may be omitted,

.....
..... (\$.....)

219. Bidders must fill out the following blanks, giving name and address of manufacturer, and where appliances are not special the trade name or catalogue number of the appliances, materials, etc., proposed to be used, with the understanding that the articles named must be in accordance with the specification requirements relative thereto and subject to the approval of the mechanical engineers:

Conduit,

Outlet boxes,

Junction boxes,

Pull boxes,

Receptacle boxes,

Plug receptacles,

Snap switches,

Knife switches for tablets,

Knife switches for switchboard,

III

Fuses, plug,

Fuses, inclosed,

Wire,

Junction cabinets,

Clock boxes,

Telephone wall boxes,

Telephone floor boxes,

Tablets and cabinets,

Switchboard,

(Signature).....

(Address).....

NAMES OF INDIVIDUAL MEMBERS OF FIRM.

.....

.....

NAME OF CORPORATION.

NAME OF SECRETARY.

.....

NAME OF PRESIDENT.

UNDER WHAT LAW CORPORATION
IS ORGANIZED.

.....

